

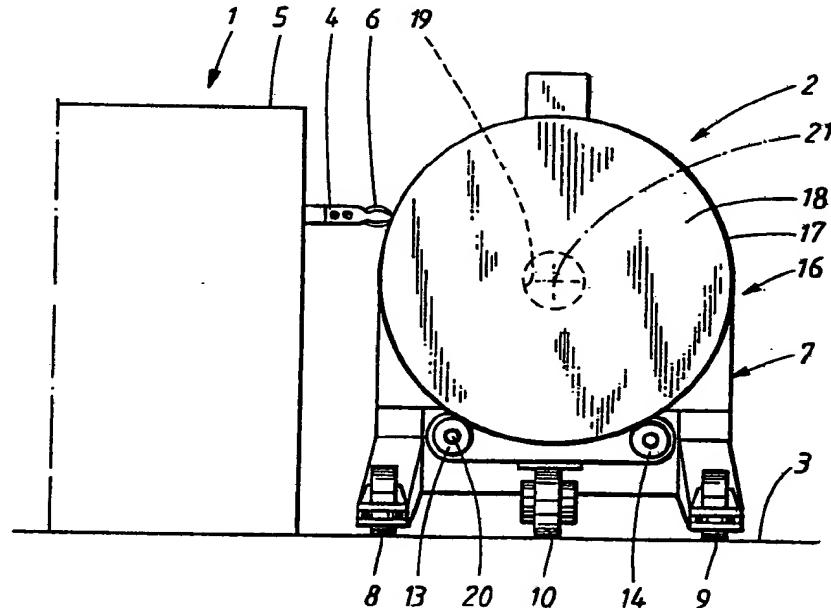


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(71) Applicant (for all designated States except US): NDC NET-ZLER & DAHLGREN CO. AB [SE/SE]; Box 55, S-430 40 Särö (SE).	Published With international search report. In English translation (filed in Swedish).
(72) Inventor; and	
(75) Inventor/Applicant (for US only) : RENSTRÖM, Mikael [SE/SE]; PI 7091 Sätinge, S-430 33 Fjärås (SE).	
(74) Agents: GRAUDUMS, Valdis et al.; Albihn West AB, Box 142, S-410 22 Göteborg (SE).	

## (54) Title: DEVICE FOR CUTTING A COVER LAYER FROM A MATERIAL ROLL



## (57) Abstract

Device for cutting a protective layer away from a material roll (16) of web-formed material, comprising a rotation device (13, 14) which rotates the roll. The rotation device includes at least two rotatable carrier rollers, on which the material roll is supported and is rotated. In this way the protective layer on the material roll is cut away from the roll during a cutting operation by means of a cutting tool (4). This contacts the roll during its rotation. The rotatable carrier rollers form lifting and carrying means on a mobile load carrier (7) in order to support the material roll whilst rotating it during the cutting operation and in order to transport the material roll to and, respectively, from a chosen place for the cutting operation.

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**Title:**

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Device for Cutting a Cover Layer from a Material Roll.

**Technical field:**

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The present invention relates to a device for cutting a protective layer away from a material roll of web-formed material, comprising a rotation device intended to rotate the roll, whereby the rotation device includes at least two rotatable carrier rollers, on which the material roll is supported and is arranged to rotate, whereby the protective layer on the material roll is cut away from the roll during a cutting operation by means of a cutting tool which is arranged to contact the roll during its rotation.

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For transport and storage of material rolls comprising web-formed material, for example paper, these are provided, in connection with manufacture, with a packaging in form of one or more protective layers on the end faces of the roll or covering layers of a strong material, for example coarse paper. Before the roll of web-formed material contained in the packaging is used, e.g. in the graphics industry, packaging industry etc., the protective layer is removed before the web material can be unrolled.

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**State of the art:**

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It is known in the art to remove the protective layer from material rolls by the material roll being transported to a station for so-called roll-stripping, whereby the roll is normally transported by means of a truck, unloaded to a rotation device at the station and whereupon by means of a knife the packaging is cut open during rotation of the roll. After removal of the packaging the material roll is again loaded onto a suitable load carrier for further

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transport to a following station for unrolling of the web-formed material. The actual removal of the protective layer is a relatively fast procedure, whilst the total procedure is however lengthened unfavourably by an unloading procedure both before and after the removal of the protective layer.

The object of the present invention is to facilitate the procedure with removal of the protective layer from material rolls.

**Summary of the invention:**

Said object is achieved by means of a device according to the present invention, which is characterized in that said rotatable carrier rollers form lifting and carrying means on a mobile load carrier in order to support the material roll whilst rotating it during the cutting operation and to transport the material roll to and, respectively, from a chosen place for the cutting operation.

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**Description of the figures:**

The invention will be described more closely with reference to an embodiment and to the accompanying drawings, in which Fig. 1 shows a perspective view of the arrangement according to the invention, whilst Fig. 2, in an end view, shows a particular embodiment with a stationary part as well as the mobile parts shown in Fig. 1 of the device in a position for cutting away the protective layer from a material roll.

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**Description of preferred embodiment:**

The device according to the invention, in a developed embodiment, can consist of a stationary unit 1 and a mobile unit 2. The stationary unit is formed from a stationary cutting device which is fixedly attached onto a floor 3 and supports a cutting tool in the form of a knife unit 4,

which projects sidewardly from a stand with a control and drive unit 5 for the cutting device 1. The knife unit 4 is for instance movably arranged relative to the control and drive unit 5 for giving controlled movement between a retracted position, for example retracted to a hidden position inside the unit 5, and a projecting cutting position shown in Fig. 2 and possibly also movable sideways, i.e. essentially horizontally. The cutting edge 6 of the knife unit extends preferably in a vertical plane or at a small angle to this.

The mobile unit 2 is built like a mobile load carrier, for example like a so-called auto carrier i.e. a self-driven self-controlled load vehicle which moves between determined positions. The vehicle can either follow a predetermined path, choose between several different predetermined paths or be programmed to choose by itself suitable routes between stations. The freedom of movement of the mobile unit is dependent on the chosen technique for controlling the unit. A commonly occurring control technique is based on fixedly inlaid control loops in the floor, whilst a more flexible solution is constituted by a previously known navigation system which is based on a rotating laser carried by the vehicle, which detects the reflections from fixed reflection points in the premises. By measuring the laser beam's angle relative to a reference line in the horizontal plane during reflection from at least two reflection points, the position can be determined and the vehicle controlled according to a chosen path by means of control equipment.

The mobile unit 2 is made up of a wagon 7 with at least three wheels 8, 9 and 10, of which at least one constitutes a steering wheel which is controlled by means of the automatic control equipment. The steering wheel 10 or any of the other wheels 8, 9 serve(s) as a drive wheel which is

driven by a drive motor for displacement of the wagon 7 with the desired speed and for starting and stopping in chosen positions. The wagon presents a lifting device 11 in the form of a so-called forklift in which the lifting device is designed as a raisable and lowerable unit, 5 movable along a guide 12. The lifting device 11 presents two lifting and carrying members 13, 14, which are formed by two carrying rollers. These form a rotation device and are therefore rotatably carried in the part of the lifting device which is formed by a vertical crab 15 which by means of a non-depicted drive mechanism is movable vertically along the guide 12. The carrying rollers 13, 14 thereby form, in the shown example, fork legs positioned essentially parallel to each other and at a suitable 10 respective distance such that they can support and rotate a roll 16 of continuous material web, e.g. paper. The roll is essentially cylindrical with a cylindrical outer surface 17 and two end faces 18. The roll normally presents a central core 19 in the form of a tube on which the material web is rolled up. The roll 16 is completely or partially 15 enclosed in a protective layer which surrounds at least the end faces 18 and is normally made from a layer of strong paper. The protective layer can even cover the outer surface 17 completely or partially. The most common form of 20 the protective layer is a sheet of paper attached on each one of the end faces, said sheet of paper being folded with a part over the roll's circular edge 22, 23 and glued against the cylinder outer surface 17. It is normally sufficient that the sheet extends a few centimetres over 25 onto the cylindrical surface.

The carrying rollers 13, 14 present a suitable, relatively small diameter and necessary length in order to be able to be inserted on either side of the support surface of the 30 material roll on a base. With the above shown dimension and respective distance it is realised that the roll is

collected from a level above the base 3, for example on a cradle or similar. The crab 15 can also be arranged such that both carrier rollers 13, 14 are movable sideways with respect to each other, preferably by means of a highly geared drive motor, whereby the carrying rollers can be adapted to different dimensions of material rolls which are to be lifted. The crab 15 further presents a drive motor for rotation of one or both of the carrying rollers 13, 14 so that after activation they can be made to rotate around their longitudinal axis 20 for rotation of the material roll 17 around its geometrical longitudinal axis 21. This rotation can be activated either manually by means of a manoeuvring member on the mobile unit 2 or remotely controlled via control and drive unit 5 or a non-depicted central computer in the material handling system.

The idea with the arrangement according to the invention is thus to remove the protective layer, i.e. the packaging, from the material roll in an efficient manner. In this example it is required that the protective layer should be removed from the end surfaces 18, which occurs in the following manner: The material roll 16 is carried into position by means of the mobile unit 2 from a warehouse, production site or similar, to the cutting position shown in Fig. 2, whereupon the rotation device is activated. This activation can occur shortly before or when the mobile unit 2 is located at the position shown in Fig. 2 close to the cutting device 1, whereby also the knife unit is activated to contact the periphery 17 of the material roll 16 and to penetrate the outer surface at one edge portion 22, 23 at a time. The packaging of the material roll 16 is made of a strong material, for example coarse paper in one or more layers, which thus shall be removed from the roll on the end faces 18 before the material web can be unrolled from this. Cutting open of the packaging by means of the cutting device 1 is achieved when the material roll 16 rotates

whilst the knife unit 6 is made to penetrate through the packaging. This occurs with the mobile unit 2 and the knife unit 6 standing still in the position shown in fig. 2. The knife unit is started and is held as near as possible to the edge portions 22, 23 of the material roll, whereby a purely annular complete cutline is achieved which thus cuts off the packaging over the end part of the roll. After a movement of either the knife unit or the mobile unit in the longitudinal direction of the roll, the knife unit is placed against the other end part, whereafter the roll is rotated and the packaging at the other end face is cut off in a similar manner whereby the protection layer falls down or is removed by hand.

After finishing cutting of the packaging, the mobile unit 2 can be activated in order to move to the next station and thus take with it the material roll without any load transfer procedure.

The invention is not limited to the embodiments described above and shown in the drawings, but can be varied within the scope of the appended claims. For example it is imaginable that the actual driven rotation of the roll occurs by way of drive means which is connected to a drive motor in the stationary unit 1. The drive means can consist of a drive roll which lies against the periphery of the roll or eccentrically against one end surface. A drive axle with engagement means can alternatively be coupled to the centre of the roll. In a simpler embodiment, the stationary unit 1 can be replaced by a person holding a cutting tool such as a knife in a manner which corresponds to that described above, i.e. during rotation of the roll on the mobile unit. In this way any suitable position whatsoever can be chosen for the cutting operation. For cutting of a roll completely or only of the packaging surrounding the outer surface, the knife unit can be made to perform a

sideways movement along the roll during its rotation whereby a spiral-formed cutline is obtained and the protective layer can be removed.

- 5 In practice the carrier members 13, 14 are made from several shorter rollers which are rotatably carried on the lifting forks of the mobile unit.

Claims

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1. Device for cutting a protective layer away from a material roll (16) of web-formed material, comprising a rotation device (13, 14) intended to rotate the roll, whereby the rotation device includes at least two rotatable carrier rollers, on which the material roll is supported and is arranged to rotate, whereby the protective layer on the material roll is cut away from the roll during a cutting operation by means of a cutting tool (4) which is arranged to contact the roll during its rotation, characterized in that said rotatable carrier rollers form lifting and carrying means on a mobile load carrier in order to support the material roll whilst rotating it during the cutting operation and to transport the material roll to and, respectively, from a chosen place for the cutting operation.

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2. Device according to claim 1, characterized in that said carrier rollers (13, 14) are raisable and lowerable by means of a raisable and lowerable lifting arrangement (11) on the load carrier (7).

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3. Device according to claim 1, characterized in that said carrier rollers (13, 14) are arranged parallel to each other and are adjustable with regard to their mutual distance.

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4. Device according to any one of the preceding claims, characterized in that said carrier rollers (13, 14) are each rotatably arranged in their respective fork leg on a forklift (11).

5. Device according to claim 4, characterized in that at least one carrier roller (13, 14) is connected to a drive motor on the mobile load carrier (7) for rotation of said carrier roller.

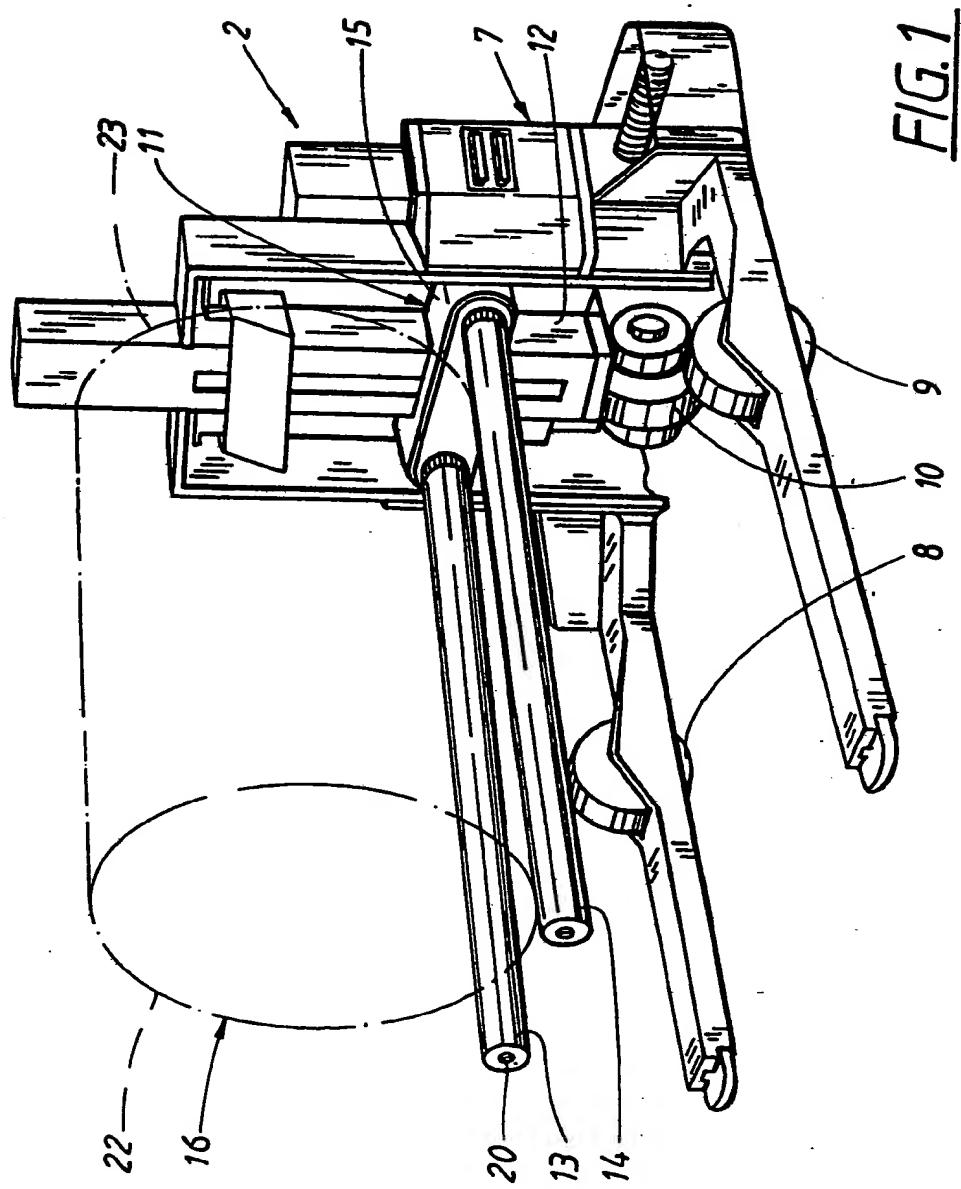
6. Device according to claim 1, characterized in that said cutting tool (4) is supported by a cutting device which forms a stationary unit (1) to which, respectively from which, the mobile unit (7) is displaced.

7. Device according to any one of the preceding claims, characterized in that said load carrier is constituted by an autocarrier included in an automatic load handling system, and in that the autocarrier is arranged to be placed into a cutting position, in which said cutting tool (4) is arranged to contact the roll's periphery.

8. Device according to claim 6, characterized in that said rotation device (13, 14) comprises a stationary drive motor arranged, in said cutting position, to position a drive member against the material roll in order to effect its rotation.

9. Device according to claim 8, characterized in that said drive motor is constituted by a drive roller in the form of a friction roller arranged to contact the periphery of the material roll (16).

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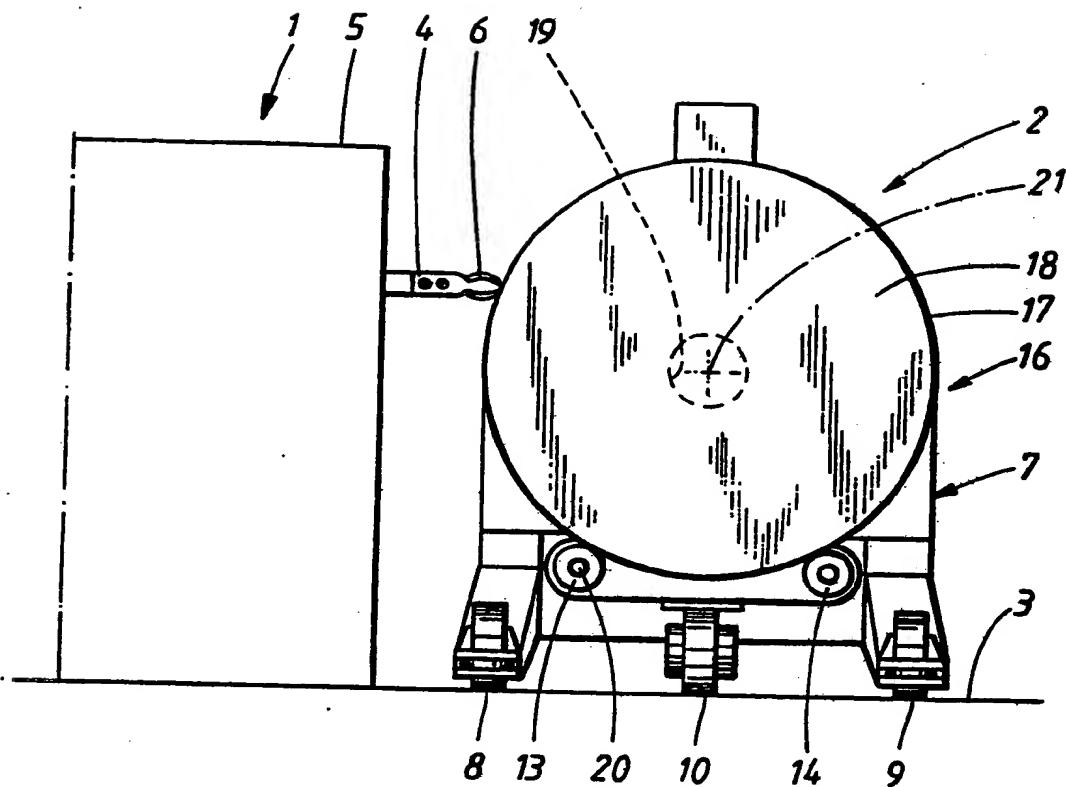


FIG.2

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 93/00160

## A. CLASSIFICATION OF SUBJECT MATTER

IPC5: B65H 19/00, B65B 69/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: B65H, B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Patent Abstracts of Japan, Vol 13, No 392, M-865, abstract of JP, A, 1-139323 (TOPPAN PRINTING CO LTD), 31 May 1989 (31.05.89) --	1-9
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## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 4821971 (T. WATANABE ET AL), 18 April 1989 (18.04.89) --	1-9
Y	DE, A1, 2337663 (MASCHINENFABRIK AUGSBURG-NÜRNBERG AG), 6 February 1975 (06.02.75) --	1-9
Y	DE, A1, 2812829 (CILANDER AG), 30 November 1978 (30.11.78) --	1-9
A	Patent Abstracts of Japan, Vol 15, No 28, M-1072, abstract of JP, A, 2-269628 (DAINIPPON PRINTING CO LTD), 5 November 1990 (05.11.90) --	
A	Patent Abstracts of Japan, Vol 15, No 28, M-1072, abstract of JP, A, 2-269629 (DAINIPPON PRINTING CO LTD), 5 November 1990 (05.11.90) --	
A, P	EP, A1, 0524828 (ISHIDA SCALES MFG. CO., LTD.), 27 January 1993 (27.01.93), figures 1-15 --	
A	US, A, 4863335 (D.P. HERIGSTAD ET AL), 5 Sept 1989 (05.09.89) --	6
A	US, A, 4948060 (R.S. KURZ ET AL), 14 August 1990 (14.08.90) -----	6

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

30/04/93

International application No.

PCT/SE 93/00160

Patent document cited in search report	Publication date	Parent family member(s)		Publication date
US-A- 4821971	18/04/89	NONE		
DE-A1- 2337663	06/02/75	NONE		
DE-A1- 2812829	30/11/78	CH-A- GB-A-	618139 1575283	15/07/80 17/09/80
EP-A1- 0524828	27/01/93	JP-A-	5042913	23/02/93
US-A- 4863335	05/09/89	AU-A- CA-A- EP-A-	3174789 1304043 0334366	28/09/89 23/06/92 27/09/89
US-A- 4948060	14/08/90	NONE		